King Fahd University of Petroleum and Minerals
Quiz 2 Math 202-141 Duration 40 minutes

Full Name:
ID:
Section and Serial number:

Question 1. Determine the largest interval I such that the IVP

$$\begin{cases} (x-2)(\ln x)\,y''' + (\sin x)\,y = \mathrm{e}^x \\ y(1/2) = y'(1/2) = 0 \quad \text{and} \quad y''(1/2) = 1 \end{cases}$$

has a unique solution on it. Justify your answer.

Question 2. Given that $y_1 = x$ is a solution of the DE:

$$(1-x^2)y'' + 2xy' - 2y = 0\,.$$

Find a fundamental set of solution of this DE on some interval I.

Question 3. Given that $y_1 = x$, $y_2 = x^2$ and $y_3 = x^2 \ln x$ are solutions of:

$$x^3y''' - 2x^2y'' + 4xy' - 4y = 0 \quad \text{on} \quad (1,\infty).$$

Find the general solution of this DE (justify your answer).

Question 4. Find the general solution of: $y^{(5)} + 5y^4 - 2y''' - 10y'' + y' + 5y = 0$.

Question 5. Given that 0 is a double root and $3+i$ is a complex root of a fourth order auxiliary equation. Form the corresponding fourth order homogeneous DE with constant coefficients.

Question 6. Find the general form for y_p of: $y'' - 4y' + 13y = xe^{2x}\cos(3x) + \sin^2(3x)$.